

Title:	TVA – Paradise Fossil Plant: Acoustic Cleaners Vs. Sootblowers	
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## Summary

TVA plans to retrofit 18 SCR reactors for NO<sub>x</sub> reduction at seven coal fired generating plants. Alstom Power is providing the design and fabrication while the construction is being performed by various site maintenance and construction partners. Cormetech is the catalyst supplier.

The first reactor was installed on Unit #2 at the Paradise Fossil Plant located in Drakesboro, KY. This unit has a nominal rating of 700 MWs and was placed into commercial operation in 1963. The reactor design included four rake style steam sootblowers to clean the honeycomb catalyst.

During construction, TVA personnel decided to install six (6) Powerwave™ acoustic cleaners (Model D-75) to compare the cleaning effectiveness against the steam sootblowers. TVA's motivation to conduct this trial was based on an effort to reduce the capital and O&M costs associated with catalyst cleaning. They realized that if the acoustic cleaners proved to be an effective cleaning system, TVA could save significant dollars in capital and O&M expenditures. This is because the total cost of installation of acoustic cleaners is approximately 20% to 50% the cost of the installation of sootblowers.

The six Powerwave acoustic cleaners were installed above the first of layer of catalyst and were responsible for cleaning half of that layer of catalyst, with sootblowers cleaning the other half. Three of the acoustic cleaners were installed along the 80'10" east wall, near two of the steam sootblowers. Because this wall was the only wall with a platform for access, the decision was made to hang the other three acoustic cleaners inside the reactor. The three acoustic cleaners were hung inside the reactor because there was concern that the acoustic cleaners mounted on the external wall may not be capable of cleaning the 49'10" width of this reactor. Hanging acoustic cleaners inside of a reactor is not an ideal arrangement, but was deemed appropriate for the trial installation.

The reactor was brought on-line in May of 2000 and was operated for approximately six weeks before it was taken off-line for a short outage. The reactor was inspected and found to be clean. The sootblowers and the acoustic cleaners were keeping ash from building up on the catalyst. During this outage, the acoustic cleaners were moved from the location above the first layer of catalyst to the area between the first and second layers of catalyst. This was done because the support beams and flat ledges between the layers of catalyst had more ash buildup than the area above the first layer. TVA personnel concluded that turbulence entering the first layer was contributing to the cleanliness.

The reactor was returned to service and operated through the ozone season. When the reactor was inspected during the next outage in October, 2000, the acoustic cleaners had performed just as well as

the steam sootblowers. The catalyst was free from buildup on both sides of the reactor. There was some buildup in the northeast corner of the reactor on the side cleaned by the acoustic cleaners. This is believed to have occurred because the acoustic cleaners that were hung inside the reactor were not operating at full intensity. The cast iron sound generator used on these horns had softened due to the heat, which changed the tolerance; thus having an adverse effect on the performance of these acoustic cleaners. In addition, there was a small buildup on the catalyst below the protective screen along the seal channels on the side cleaned by the acoustic cleaners that was not present on the side cleaned by the sootblowers. This may be caused by the seal channels blocking the acoustic energy. This buildup is considered to be insignificant, but will be monitored on future inspections.

While the reactor was off line, dB readings were taken to determine the energy output of each acoustic horn. The dB readings measured on the opposite wall (49'10", away from the acoustic cleaners mounted on the exterior wall), were nearly the same as the dB readings on the acoustic cleaners hung inside the reactor, which were less than 25' from the opposite wall. Thus, it was determined that the three acoustic cleaners hung inside the reactor provided very little additional cleaning energy, which is likely the reason for the nominal build up in the northeast corner of the reactor.

Based on the results of this trial installation, TVA competitively sought proposals for the installation of acoustic cleaners on the Paradise Unit 1 SCR, which is identical to Unit 2. BHA was the successful bidder for 40 Powerwave acoustic cleaners (Model D 75) to complete this project.

Each layer of catalyst on Unit 1 will be equipped with ten (10) acoustic cleaners, eight of which will be installed across the 80'10" east wall and one acoustic cleaner installed on each of the 49'10" north and south walls to address the ash buildup found along the west wall during the trial. TVA will operate both reactors this coming ozone season, one reactor with steam sootblowers and one reactor with acoustic cleaners. The evaluation is still in progress!